smiths

SMITHS PERFORM
IN **AEROSPACE**

Human Factors Training in an Avionics Maintenance Organisation

Presented by Nigel Moody

- **CUSTOMER SERVICES – CHELTENHAM IS AN INDEPENDENT MAINTENANCE ORGANISATION CO-SITED WITH THE OEM DESIGN AND MANUFACTURING FACILITY**
  - **IT HAS NO DESIGN AUTHORITY. ANY DESIGN CHANGES REQUIRED HAVE TO BE ADDRESSED THROUGH THE OEM DESIGN ORGANISATION**

PHILOSOPHY:

- DEVELOP A HUMAN FACTORS MODEL WHICH COULD BE UTILISED ACROSS ANY SMITHS AEROSPACE SITE WORLD-WIDE

- DEVELOP CORE TRAINING MATERIAL WHICH COULD READILY BE CUSTOMISED BY ANY SMITHS AEROSPACE SITE WORLD-WIDE TO SUIT ITS OWN PARTICULAR APPLICATION

- **TRADITIONALLY WE WOULD HAVE UNDERTAKEN THE WHOLE TASK WITHIN THE COMPANY**

- **FOR THIS SUBJECT WE DECIDED THAT THE BEST APPROACH WOULD BE TO UTILISE THE SERVICES OF A CONSULTANT**

MANAGEMENT COMMITMENT:

- **ONE DAY TRAINING SESSION HELD WITH CUSTOMER SERVICES WORLD-WIDE TOP LEVEL MANAGEMENT AND SENIOR MANAGEMENT WITHIN CUSTOMER SERVICES EUROPE**

Smiths Aerospace Customer Services

Form Ref: CSD/CD197
Date: June 2004

Issue: 3
Sheet: 1 of 1

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Corrective Action Request Form

NAME:	PART No:	CARF No: .....
DEPT:	RRC No:	DATE: .....

Please identify source of potential hazard:

- ☐ Maintenance Documentation (specify): .....
- ☐ Procedural Documentation (specify): .....
- ☐ Tooling, Fixtures and Test Equipment (specify): .....
- ☐ Unsafe Conditions (specify): .....
- ☐ Bad Practices (specify): .....
- ☐ Other (specify): .....

Nature of discrepancy (please specify below):

Where appropriate please attach a marked–up copy identifying corrections required

Allocated to:

Name: ..... Date: __/__/__

Comments:

Action Completed:

Signature: ..... Date: __/__/__

Originator Acceptance:

Signature: ..... Date: __/__/__

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Smiths Aerospace Customer Services

Form Ref: CSD/ICD198
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Task Handover

CODE/PART No:	**RRC No:** .....
SERIAL No:	**DATE:** __/__/__

Work status up to point of hand over (e.g. "see RRC"):

General description of tasks required to assist unit/assembly handover:

Key additional information (specify below):

( ) Maintenance/Engineering data
( ) Equipment and tools
( ) Materials and parts
( ) Facilities (e.g. Plating, Environmental testing)
( ) Other

Signed: ..... **(outgoing Technician)** **Printed Name:** ..... **Date:** .....

Signed: ..... **(incoming Technician)** **Printed Name:** ..... **Date:** .....

On completion of maintenance, this form is to be retained with the relevant RRC and Maintenance Record Pack

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Smiths Aerospace Customer Services

Form Ref: CSD/ICD200
Date: August 2003

Issue: 1
Sheet: 1 of 1

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Procedure Review Form

Procedure No: .....

Issue No: ..... Draft No: ..... (as applicable)

The above procedure has been validated for use and is considered:

Acceptable: ☐ Not Acceptable: ☐

Comments if not acceptable:

Name: .....

Signature: ..... Date: .....

☐ = Check as applicable

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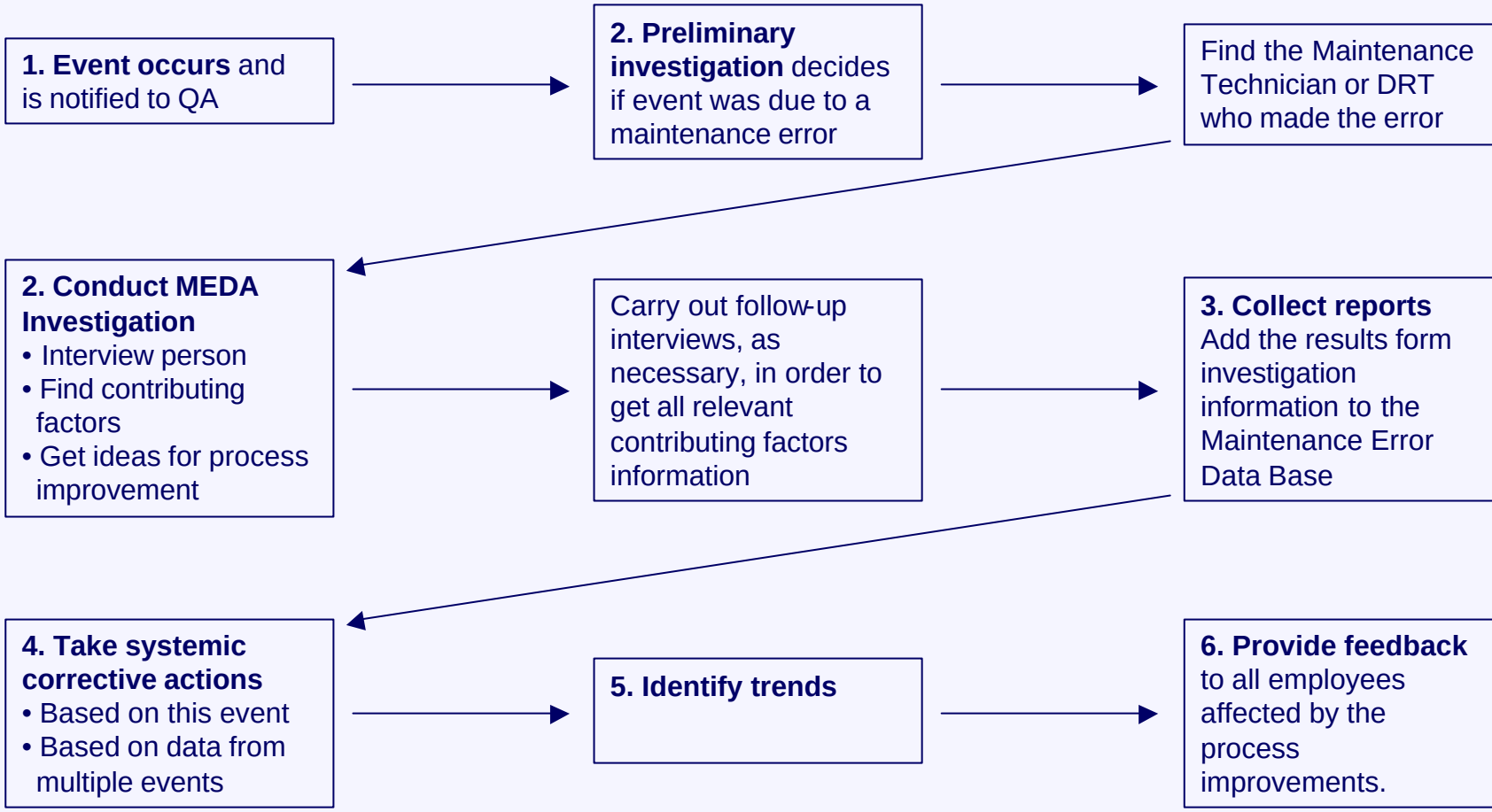
MEDA INVESTIGATION PROCESS



Smiths Aerospace Customer Services

Form Ref: CSD/CD199 Issue: 1
Date: October 2003 Sheet: 1 of 4

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Maintenance Error Decision Aid

SECTION I - GENERAL

Reference No: .....
Smiths Site of Repair: .....
Airline/Station/Customer concerned: .....
Part No: .....
Serial No: .....
Customer Ref. No. (if appropriate): .....
Date of Notification of Maintenance Error: __ / __ / __

Investigator's Name: .....
Investigator's Telephone No: .....
Date of Investigation: __ / __ / __
Shift of Error (Circle): Day, Swing, Night
Type of Maintenance (Circle): In-house, External
Closure Date: __ / __ / __

SECTION II - SUMMARY OF CONTRIBUTORY FACTOR, ERROR AND EVENT

Please summarise:

SECTION III - EVENT

Please identify the event:

__ a) Aircraft Damage
__ b) Aircraft Incident
__ c) Injury
__ d) Warranty Claim
__ e) Major Internal Incident
__ f) Other

Describe the incident/degradation/failure that caused the event:

SECTION IV - MAINTENANCE ERROR

Please identify the type of maintenance error (identify only one):

Repair Activity

__ a) Incorrectly repaired/assembled
__ b) Fault not found
__ c) Incorrectly/Incompletely tested
__ d) Incorrectly inspected
__ e) Incomplete maintenance undertaken
__ f) Incorrect replacement part installed
__ g) Damaged
__ h) Incorrect fluid levels and/or type
__ i) Foreign object in unit
__ j) Other

Describe the specific maintenance error:

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Maintenance Error Decision Aid

SECTION V - CONTRIBUTING FACTORS CHECKLIST (ROOT CAUSE)

N/A ___

1. Information (e.g. Maintenance Manuals Service Bulletins procedures etc.

__ a) Not understandable
__ b) Unavailable/Inaccessible
__ c) Incorrect
__ d) Too much/Conflicting information
__ e) Update process is flawed
__ f) Information not used
__ g) Wrong issue used
__ h) Other (Explain below)

Describe specifically how the identified information above contributed to the error:

N/A ___

2. Equipment/Tools/Parts

__ a) Unsafe
__ b) Unavailable
__ c) Unreliable
__ d) Poor controls or displays
__ e) Mis-calibrated
__ f) Inappropriate for the task
__ g) No/Poor instructions in usage
__ h) Too complicated
__ i) Incorrectly labelled
__ j) Not used
__ k) Other (Explain below)

Describe specifically how the identified equipment/tool/part above contributed to the error!

N/A ___

3. Equipment design/configuration

__ a) Complex/Not user friendly
__ b) Configuration variability between equipments
__ c) Accessibility
__ d) Easy to install incorrectly
__ e) Other (Explain below)

Describe specifically how the equipment design/configuration above cotributed to the error:

N/A ___

4. Job/Task

__ a) Repetitive/Monotonous
__ b) Complex/Confusing
__ c) New/Altered task
__ d) Different from other similar tasks
__ e) Other (Explain below)

Describe specifically how the job/task identified above contributed to the error:

N/A ___

5. Technical knowledge/Skills

__ a) Inadequate skills
__ b) Inadequate knowledge of task
__ c) Inadequate task planning
__ d) Inadequate knowledge of equipment
__ e) Smiths procedures knowledge
__ f) Other (Explain below)

Describe specifically how the technical knowledge/skills identified above contributed to the error:

Maintenance Error Decision Aid

SECTION V - CONTRIBUTING FACTORS CHECKLIST (ROOT CAUSE) - Continued

N/A ___

6. Factors Affecting Individual Performance

__ a) Physical health (including hearing and sight)
__ b) Fatigue
__ c) Time constraints
__ d) Peer pressure
__ e) Complacency
__ f) Body size/strength
__ g) Personal event (e.g. family problem, car accident)
__ h) Workplace distraction/interruption
__ i) Memory lapse
__ j) Other (Explain below)

Describe specifically how factors affecting individual performance identified above contributed to the error:

N/A ___

7. Environment/Facilities

__ a) Noise level
__ b) Temperature
__ c) Humidity
__ d) Lighting
__ e) Rain/Snow
__ f) Wind
__ g) Vibrations
__ h) Cleanliness
__ i) Hazardous/Toxic substances
__ j) Power sources
__ k) Inadequate ventilation
__ l) Other (Explain below)

Describe specifically how environment/facilities identified above contributed to the error:

N/A ___

8. Organisational Environment Issues

__ a) Technical support (e.g. Engineers, Tech Pubs, etc.)
__ b) Company policies/work processes
__ c) Unions
__ d) Stability of work force
__ e) Not enough trained staff
__ f) Corporate change/restructuring
__ g) Work process/procedure incorrect
__ h) Work process/procedure not followed
__ i) Work process/procedures not documented
__ j) Workgroup normal practice
__ k) Other (Explain below)

Describe specifically how organisational environment issues identified above contributed to the error:

N/A ___

9. Leadership/Supervision

__ a) Poor planning/organisation of tasks
__ b) Inadequate prioritisation of work
__ c) Inadequate delegation/assignment of tasks
__ d) Unrealistic attitude/expectations
__ e) Style of supervision
__ f) Other (Explain below)

Describe specifically how leadership/supervision issues identified above contributed to the error:

N/A ___

10. Communication

__ a) Between departments
__ b) Between people
__ c) Between shifts
__ d) Other (Explain below)

Describe how communication issues identified above contributed to the error:

N/A ___

11. Other Issues (Explain below)

Describe specifically how this other issue contributed to the error:

Maintenance Error Decision Aid

SECTION VI(a) - ERROR PREVENTION STRATEGIES

What current existing procedures, processes and/or policies in your organisation are intended to prevent the incident, but did not?

__ **Maintenance Policies/Procedures/Processes** (specify): .....

__ **Inspection or Functional Check/Test** (specify): .....

Required Maintenance Documentation

__ Maintenance Manuals (specify): .....
__ Work cards/instructions (specify): .....
__ Engineering documents (specify): .....
__ Other (specify): .....

Supporting Documentation

__ Factory modification sheets (specify): .....
__ Service Bulletins (specify): .....
__ Training material (specify): .....
__ Drawings/Test Notes/Specifications (specify): .....
__ Other (specify): .....

__ **Other** (specify): .....

SECTION VI(b) - IMMEDIATE AND LONG TERM CORRECTIVE/PREVENTIVE ACTIONS

List recommendations for error prevention strategies (List each as a separate line item)

Recommendation:	Responsible Manager:	Projected Completion Date:

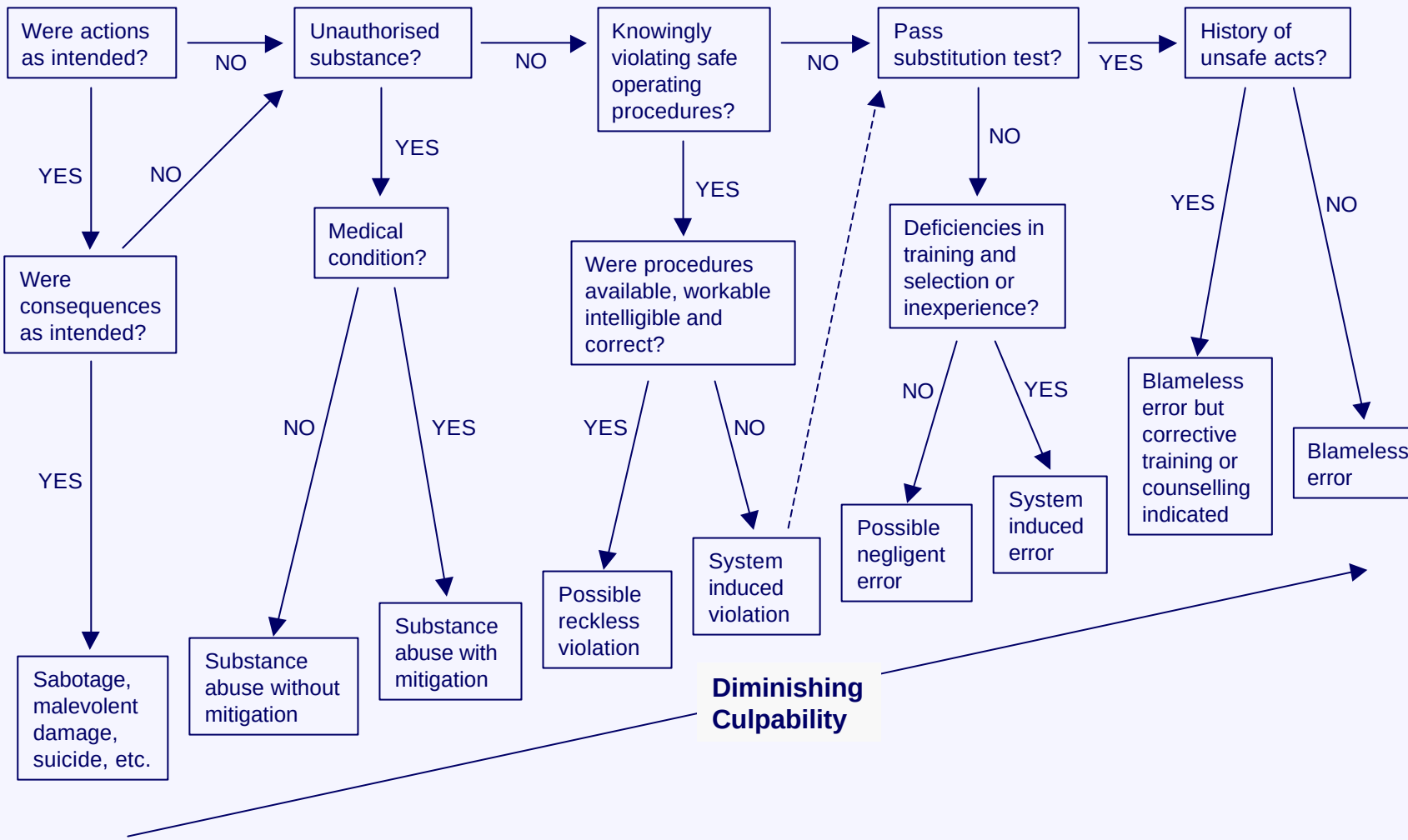
POSSIBLE INVESTIGATION THRESHOLDS

- WARRANTY RETURNS
- SIGNIFICANT INCIDENTS DISCOVERED INTERNALLY OR EXTERNALLY (INCLUDING TECHNICIAN MISTAKE, OR INACTION, AND WHERE APPROPRIATE, CARF REPORTED ISSUES)
- AN EVENT'S IMPACT ON OPERATIONS (OUT OF WORKSHOP PERFORMANCE, DELIVERY DELAYS)
- REGULATORY ISSUES
- SUSPECT PARTS

THE INVESTIGATION PROCESS WILL BE HAMPERED UNLESS THERE HAS BEEN :-

- **THE ESTABLISHMENT OF A JUST CULTURE TO ENSURE THAT PERSONNEL ARE NOT INAPPROPRIATELY PUNISHED FOR REPORTING OR CO-OPERATING WITH OCCURRENCE INVESTIGATIONS**

A METHOD OF DETERMINING AN INDIVIDUAL'S CULPABILITY



TRAINING LEVELS

Level 0 – Not applicable to this functional group or company does not require it (e.g. don't work shifts).

Level 1 – General appreciation of theory and basic principles appropriate to job role.

Level 2 – In-depth knowledge and the ability to apply to other people under their control.

Level 3 – Full theoretical knowledge and competence to apply in their job role.

Human Factors Syllabus module titles	Company training Module number	EASA GM-145.A.30(e) syllabus module number
Introduction to human factors	1	1
Human error	2	2,9
Human Error – slips and lapses	3	3,9
Human Error - violations	4	4,6,9
Avoiding and managing error	5	3
Human performance and limitations	6	4
Environmental factors	7	5,6
Teamwork	8	8,9
Communication and handovers	9	7
Organisation's HF Programme	10	10

Module 1 TNA - General / Introduction to Human Factors

	Accountable manager	Senior Managers	Managers & Supervisors	Certifying staff inc.	Non certifying staff	Planners & production control staff	Tech. services & Design engineers	Human factors staff/ instructor	Quality assurance Engineer/ surveyor	Technical record staff	Purchasing staff	Store department staff	Ground equipment operators/ Drivers/ Labourer
The need to address Human Factors	1	1	1	1	1	1	1	2	2	1	1	1	1
Affects of Human Factors on airworthiness	1	1	1	1	1	1	1	1	1	1	1	1	1
Statistics and incidents	1	1	1	1	1	1	1	1	1	1	1	1	1

Module 2 TNA - Human Error

	Accountable manager	Senior Managers	Managers & Supervisors	Certifying staff inc.	Non certifying staff	Planners & production control staff	Tech. services & Design engineers	Human factors staff/ instructor	Quality assurance Engineer/ surveyor	Technical record staff	Purchasing staff	Store department staff	Ground equipment operators/ Drivers/ Labourer
Types of errors in maintenance	1	2	2	1	1	2	1	3	3	1	2	0	0
When we are most prone to error	1	2	2	1	1	2	1	3	3	1	0	0	0
Organisational accidents	2	2	2	1	1	2	1	3	3	1	2	0	0
System defences	2	2	2	1	1	2	1	3	3	1	2	0	0

Module 10 TNA - Organisation's HF Program

	Accountable manager	Senior Managers	Managers & Supervisors	Certifying staff inc.	Non certifying staff	Planners & production control staff	Tech. services & Design engineers	Human factors staff/ instructor	Quality assurance Engineer/ surveyor	Technical record staff	Purchasing staff	Store department staff	Ground equipment operators/ Drivers/ Labourer
All elements to be covered by all staff	3	3	3	3	3	3	3	3	3	3	3	3	3

HF TRAINER ACCEPTABILITY CRITERIA

- HAS ATTENDED AN ACCEPTABLE HUMAN FACTORS TRAINING COURSE THAT COVERS THE EASA PART-145 INITIAL TRAINING SYLLABUS

- HAS RECEIVED ADDITIONAL INSTRUCTION IN TRAINING AND FACILITATION TECHNIQUES

- HAS WORKED FOR AT LEAST 3 YEARS FOR SMITHS CUSTOMER SERVICES OR A MAINTENANCE ORGANISATION MAINTAINING SIMILAR TECHNOLOGY/SCOPE OF WORK EQUIPMENT

OUTCOME:

- MOST PERSONNEL HAVE EMBRACED THE HUMAN FACTORS PHILOSOPHY
- PERSONNEL ARE IDENTIFYING WHEN, DURING THE COURSE OF THEIR DAILY DUTIES, THEY ARE ENTERING THE ERROR ZONE
- BETTER WORKING RELATIONSHIP BETWEEN QUALITY AND WORKSHOP TECHNICIANS